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PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY.

Vol. II. NOVEMBER & DECEMBER, 1841. No. 20.

Stated Meeting, Nov. 5.

Present, thirty-three members.

Dr. Patterson, Vice President, in the Chair.

Letters were received and read:—

From the Royal Society of Göttingen, dated April 20, 1841,—the Royal Society of Copenhagen, dated 3d May, 1841,—the Royal Academy of Inscriptions and Belles-Lettres, Institute of France, dated 20th August, 1841,—the Royal Academy of Sciences, Institute of France, dated 23d August, 1841,—and the Royal Geological Society of Cornwall, dated Penzance, 25th Sept, 1841; severally acknowledging the receipt of copies of the Transactions and Proceedings of the Society, and transmitting donations to the Library:—

From the Secretary of the London Electrical Society, dated 7th July, 1841, presenting the entire series of the Transactions and Proceedings of that Society:—

From Mr. Charles Nagy, dated Vienna, 10th March, 1841, accompanying donations to the Library, and referring to experiments, making under his direction, with the invariable pendulum:—

From Professor Palfrey, dated Boston, 28th Sept. 1841, presenting a copy of his Lectures.

The letter of Mr. Nagy was referred to a committee.

The following donations were announced:—

FOR THE LIBRARY.

Flora Batava. No. 122. Amsterdam. 4to.—*From H. M. the King of the Netherlands.*

Laws of Pennsylvania, passed at the Session of 1841. 8vo.—*From the Commonwealth.*

Verhandlingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen. XVIIde Deel. Batavia, 1839. 8vo.—*From the Batavian Society of Sciences.*

The Transactions and the Proceedings of the London Electrical Society, from 1837 to 1840. London, 1841. 4to.—*From the Society.*

Proceedings of the London Electrical Society, Session 1841–42. Parts I. II. London. 8vo.—*From the same.*

De l'Application des Axiomes de la Mécanique et du Calcul Géométrique aux Phénomènes de l'Électricité, par Richard Laming. Paris, 1839. 8vo.—*From the same.*

Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. I. Nos. 5, 6.—*From the Society.*

Historia Academiæ Scientiarum Pazmaniæ Archi-Episcopalis ac M. Theresianæ Regiæ Literaria. Buda, 1835.—4to.—*From Mr. Charles Nagy, of Hungary.*

M. Tudós Társasági Névkönyv Astronomiai Naplóval és Kalendáriommal, 1841-re. Buda. 12mo.—*From the same.*

Az égi és földtekék' használata, &c. Bécsben, 1840. 12mo.—*From the same.*

Auswahl aus den Diwanen des Mewlana Dschelaleddin Rumi. Vienna, 1838. 4to.—*From Mr. J. G. Schwarz, of Vienna.*

Armenische Vorschriften und Kalligraphien herausgegeben von P. A. B. &c. 2 Nos. Vienna, 1837. 4to.—*From the same.*

Verzeichniss der Chinesischen und Japanischen Münzen des K. K. Münz-und Antiken-Cabinetes in Wien, &c., von Stephan Endlicher. Vienna, 1837. Fol.—*From the same.*

Catalogue of Skulls of Man and the Inferior Animals, in the Collection of Samuel George Morton, M.D., &c. &c. Philadelphia, 1840.—*From the Author.*

Review of the Crania Americana, from Silliman's Journal.—*From the same.*

Memoir of William Maclure, Esq. &c. By S. G. Morton, M.D. &c. 1841.—*From the same.*

Lettre sur le Rhopalodon, genre du Saurien Fossile du Versant Occidentale de l'Oural, par G. Fischer de Waldheim, &c. &c. Moscow, 1841. 8vo.—*From the Author.*

Catalogue of the Officers and Students of Bowdoin College. 1841.—*From Mr. D. R. Goodwin.*

Société Royale et Centrale d'Agriculture: Bulletin des Séances. Tome II. No. 5. June, 1841.—*From Mr. D. B. Warden.*

Tracts. Catalogues of Collections of Rocks, Fossils and Petrifactions, published by the Heidelberg Mineralogical Institute, 1841. Plusieurs Rapports à la Société d'Agriculture, &c., par M. le Baron de Mortemart de Boisse, Rapporteur. Des Haras en France, &c. &c. &c.—*From the same.*

The American Medical Library and Intelligencer, &c. N. S. Vol. I. No. 4. By Robley Dunglison, M.D. &c. &c.—*From the Editor.*

The Charter of Privileges, granted by William Penn,—and Laws of the Government of Newcastle, Kent and Sussex, upon Delaware. Philadelphia, 1741. Fol.—*From Mr. Meigs.*

FOR THE CABINET.

Typographical Specimens, from the Typometry of Mr. Raffelsperger, of Vienna, including Maps, Portraits, &c.—*From Mr. J. G. Schwarz, of Vienna.*

The Committee, consisting of Dr. Horner, Mr. Wetherill, and Dr. Goddard, to whom Dr. Harlan's paper entitled, "Description of the Bones of a Fossil Animal of the Order Edentata," was referred at the last meeting, made a report recommending its publication in the Transactions; which was ordered accordingly.

These bones form part of the extensive collection of fossils recently exhibited in Philadelphia, by Mr. A. Koch, by whom they were obtained in Benton County, Missouri.

Among them, more or less perfectly preserved, are two ossa humeri, two tibiæ, two portions of the radius, two of the clavicle, parts of several ribs, twelve vertebræ, a cubitus, twenty-four teeth, eight of them in their sockets, two fragments of a lower jaw, with two and three teeth *in situ*, two fragments of the upper jaw, five ungueal phalanges, the sternum of four articulated pieces, and a part of the ilium and sacrum.

These specimens apparently belonged to three individuals of the same species. They were found, with portions of a mastodon, in company with numerous tropical vegetable remains. They are friable and light, not petrified, but destitute of animal matter.

The teeth are very similar in structure to those of the Megalonyx, though the pieces of the lower jaw are stouter: the jaws may have contained six or seven teeth on each side.

The largest os humeri is twenty inches long, and fourteen in diameter; it is of a massive structure, and deeply grooved by the muscular attachments. In place of a foramen, as in the humerus of the Megalonyx, the exterior surface, near the elbow joint, has a deep groove, for the origin of the flexor muscles. The condyles are of great breadth, as in the Megatherium. The inferior articulating surface consists of two facets, one exterior and convex, the other described by Dr. Harlan as concavo-convex, admitting a ginglymous and rocking motion.

The cubitus or ulna is a short and strong bone, with strong marks of muscular attachments: this was part of an animal of less size than that to which the large humerus belonged. A peculiarity of this bone consists in the position of its superior articulating surface, which is nearly in the middle of its shaft; the olecranon process being very long, and extending upwards. The lower articulating surface was articulated with the carpal bones, as well as the radius. The total length of this bone is sixteen inches.

There are four claws, or phalangeal bones of the fore-foot of a small-sized individual: in general form these bones approach nearest to those of the Orycteropus.

There are two tibiæ belonging to different individuals of different sizes: one is ten inches five-tenths in length, the other ten inches. This is a short, thick and strong bone. Its upper articulating surface is nearly a circular concave disc. Its lower anterior extremity is marked by a peculiar deep ovoid depression, or hollow, for the reception of a corresponding hemisphere, projecting upwards from the astragalus; forming together, a structure of joint altogether unique. The motions of the ankle joint were rotatory, but the articulating surface of the lower aspect of the astrogalus admitted of ginglymous motion with the os calcis.

The clavicle and ribs, portions of which only exist, are not distinguished by any remarkable characters: but the foramen for the passage of the spinal marrow, in the vertebræ, is exceedingly small, an unaccountable feature in a skeleton, which in all other respects, demonstrates great physical strength as one of its most remarkable characteristics.

The portion of sternum belonged most probably to the largest of the three individuals; the animal being apparently less than the Megatherium and larger than the Megalonyx.

Dr. Harlan proposes to name this animal "Orycterotherium Missouriense."

Professor Henry, of Princeton, gave a verbal account of a series of experiments he had made on Magnetic Distribution, and which he intended to present as the fifth number of his contributions. A full account of these experiments will be given hereafter.

Professor Henry also gave an account of some observations he had made on the effects of a thunder storm which visited Princeton on the evening of the 14th of July, 1841.

Storms of this kind, he said, are not very frequent at Princeton: but two severe ones have passed immediately over the place within the last nine years, and the lightning has struck but twice in the village, during the same time. It is thought by some of the inhabitants, that damage by lightning was more frequent some years ago than it has been lately; and the idea has been suggested that the water of the canal, which passes to the south of this place, may have had some effect in determining the course of the cloud. Be this as it may; the thunder storm generally comes from the south-west, and before it reaches the village it usually divides into two parts, one of which passes along the edge of Rocky Hill, and the other along the valley of Stonybrook, so that the principal part of the storm seldom passes immediately over the village; and when it does thus pass it is generally at a great elevation, and the thunder is not so loud as that which the observer has been in the habit of hearing at the north. In connection with this remark, Prof. Henry mentioned, that he has several times observed the lightning assume a beautiful violet colour, similar to that of the vapour of iodine, and this was particularly the case during a storm which occurred on the 12th of April, 1840. On this occasion, although the cloud and the flashes appeared directly over head, yet the sound of the thunder seemed to come from a distance. The peculiar colour may, perhaps, receive a sufficient explanation, by referring it to the fact of the discharge taking place at a great altitude, and consequently in comparatively rarefied air, as in the case of the colour exhibited by the spark through a vessel partially exhausted.

The storm of the evening of the 14th of July, was said to be more severe than any which had visited Princeton for twenty years before. It commenced between 7 and 8 o'clock, and lasted about three hours; the thunder was almost continuous, but, except in two or three cases, it was not very near. Several buildings and other objects were struck in the vicinity of Princeton, and also Mrs. Hamilton's house, which is situated in the village, about 20 rods west of the college, on the opposite side of the way. It seemed a little surprising that this house should be singled out, since the buildings on either side are considerably higher, although at a few rods distance; and in front of the one to the west is a number of tall trees. The house is also furnished with a lightning rod; but this, like most of the rods erected in the country, is not formed in accordance with the most scientific principles. The front of Mrs. Hamilton's house is parallel with the main street, and is nearly in an east and west direction. The building is of brick, with a shingle roof, and two stories high: it has on the front three upper windows, and two windows and a door below; the latter being immediately under the western upper window. The chimney is on the eastern end, and the lightning conductor is supported against this. The rod is formed of round iron, three-eighths of an inch thick, and the several parts of it are imperfectly connected by hooks and eyes. It appears to be merely thrust into the ground to the depth of about two feet, and is terminated above by three prongs instead of one; the points of which are blunted by long exposure, but do not exhibit any appearance of fusion. The top of the rod is not more than six feet above the ridge of the roof; and since the house is about thirty feet long, the farther end of the ridge is unprotected. A point, according to the experiments of Mr. Charles, can only protect a circular space, the radius of which is not greater than twice the height of the point above the plane to be protected.

The lightning, according to the accounts of several persons, came from a cloud situated to the south-west, and the discharge did not strike the most elevated part of the building, but the western end of the horizontal wooden gutter which extends along the front of the house under the eaves. This point is at the greatest possible distance from the extremity of the lightning rod, and perhaps as near to the cloud as any other part of the building. The discharge immediately divided itself into two parts: one of these, and probably the larger, passed along the gutter, which must have been filled with water at the time, to the eastern end of the same, and then down to the earth along an ordinary tinned-iron pipe or conductor, which conveys the water from the gutter to the pavement below. Marks of its passage were observed along the gutter, and particularly near the end next the metallic conductor. The other part of the discharge passed immediately downward through the end of the gutter which first received the shock, to the casing of the window below; and was probably thus deflected out of its course by the attraction of the iron hinges and bolts of the shutters. Its course to the ground was further traced along the casings on each side of the front door. The wood was cracked at every place where a nail happened to be in the line of the discharge, and at some places the lightning appeared merely to pass along the surface making a groove in the wood of about one-eighth of an inch in width, and six or seven inches long: several of these grooves were observed on the side casings of the door. Three panes of glass were broken in the window above the door, and the pieces were thrown inward. The entrance within the door was filled with dust, and a strong sulphurous odour was perceptible for an hour or more after. No marks of a discharge were found at the foot of the lightning rod.

During the storm, several females were alone in the house, and at the time it was struck, three of these were in the front room in the second story, and consequently near the line of the discharge along the gutter. Two were on a bed placed against the partition wall, opposite to the front, and the third female was standing on the floor about eight feet from the front window, with her face to the same. Those on the bed were unaffected; but the one on the floor stated that she felt a sensation on her right ear, as if it had been touched with a live coal; at the same time she felt a rushing sensation down her side and perceived a flash at her foot, and a forked spark in the air between her and the nearest window. One of the persons on the bed also stated that she saw the forked spark in the air, and that the female on the floor appeared to her for an instant as if surrounded with light. The outside shutters of the window opposite to which the female was standing, were closed, and also one leaf of the shutters of the window farther east. The western window, or that from which the glass was broken, was not in the same room, but in a small adjoining one, over the main entrance from the front door. The chamber door was shut at the time, and no marks of the entrance of the electricity into the room could be found on the walls or on the casings of the two windows.

The principal facts here detailed, although perhaps not unusual occurrences, afford interesting illustrations of the action of electrical induction. First, the horizontal gutter and the vertical tin pipe, both filled with water, formed a long continuous electrical conductor, extending from the point where the lightning first struck to the lower farther corner of the front of the house; and this conductor, on account of its length, would be intensely affected by the induction of the distant cloud, or rather by that of the approaching discharge. If the electricity of the cloud were positive, then that of the water in the nearest end of the gutter would be negative, and, consequently, a powerful attraction would determine the lightning on the point where it struck. The house, under these circumstances, might have been damaged even had the rod been much higher than it was, and its connection with the earth much more perfect.

Again, the phenomena exhibited to the females in the upper chamber were also most probably due to inductive action. After a proper allowance for imperfect observation, occasioned by the fright and confusion of the moment, it is still evident that the female on the floor was in some degree affected by the discharge, although none of the electricity of the cloud actually entered the room, since no traces of it were to be found on the walls or other parts. The effects may therefore be referred to the inductive action of the lightning at a distance and through the wall, as it passed along the gutter across the front of the house. When a shock of electricity from a Leyden jar is passed through a slip of tinfoil pasted on one side of a pane of glass, the hand on the other side will receive a slight sensation from the lateral induction through the glass. In the same way, it may be supposed, that the effects perceived by the females were due to the disturbance for an instant of the natural electricity of the chamber, by the passage of a large charge along the outside of the house.

The discharge, as has before been stated, came from the southwest, and in its passage it crossed obliquely some houses on the opposite side of the street. In one of these, two persons were sensibly affected by the shock; and another, in a room with the windows closed, according to her own statement, saw sparks of electricity on the floor. The same explanation will also apply to these effects.

During the same storm, another house about three miles southwest of the village was struck, and this also was furnished with an imperfect conductor. The upper part of the rod had been broken, and it hung down, so that no part was above the chimney. The lightning struck the eastern chimney, which was on the end of the house opposite to that to which the rod was attached, and passed down the inside of the flue to the kitchen fire-place, in which wood was burning at the time. It threw down a great quantity of soot, filled the lower rooms with smoke, and diffused, according to the account, a strong smell of gunpowder. A part of the charge passed to the outside through the thick stone wall which forms the back of the chimney, and was evidently attracted by the iron hoop of a large cask which was nearly against the wall. It made a triangular hole, as if the stone and mortar had been burst outwards by an explosive force, and this was directly opposite the nearest part of the hoop. It then descended along the cask to the ground, breaking off all the wooden hoops in its course, while those of iron were undisturbed. The house is about sixty feet long; and from the state of the rod, the greater part of this distance might be considered as unprotected. The stroke fell on the end most remote from the approaching storm, and probably the lightning was drawn to this chimney rather than the other on account of the heated air which was escaping from it at the time.

Effects were also produced in this case, which can only be explained on the principles of induction. Three persons, the man of the house, his wife and son, all took refuge on a bed in a room separated from that through which the chimney passes, and upwards of twenty feet from the line of the electrical discharge. They were all lying across the bed, with their feet hanging down the side, and they each received a shock in the knees and lower joints of the legs. The female stated that the feeling was precisely like that which she had experienced from a shock from an electrical jar. No marks of the entrance of any part of the discharge from the cloud were found on the plastering or any other parts of the room; the effect can therefore only be accounted for, by a sudden disturbance of the equilibrium of the natural electricity of the space within the room.

The induction of an electrical cloud is often exerted at an astonishing distance. It has long been known, that a delicate gold-leaf electrometer is sometimes affected by the presence of an electrical cloud immediately over head; but Dr. Ellet, professor of chemistry in the college of South Carolina, has informed Professor H., that if one of Dr. Hare's single-leaf electrometers be furnished with a pointed metal rod attached to the cap, and then placed on the sill of an open window in the upper story, the leaf will be seen to touch the ball at the moment of a flash, although the lightning is several miles distant.

Prof. Bache gave an account of the formation of cumulus cloud from the action of a fire, as witnessed by him in the month of August last, at Ellicottville, in the state of New York.

The place where this phenomenon was observed is nearly surrounded by hills; the valley in which it is situated extending to the southward. Near the foot of the hills on the north side of the village, a fire was made of the heavy timber which had been felled in clearing a small tract of land. The column of heated air from the fire, made visible by the smoke and condensing vapour, rose almost vertically, widening irregularly as it rose, curling over at the sides and reaching various heights. On one occasion, when the height of the column, judging from the known distance of the fire and the angle of elevation, was about three-tenths of a mile, the top flattened out, presenting a mushroom appearance. The smoke having been left behind in the ascent of the heated air, the condensed vapour forming the top of the column and presenting precisely the appearance of a cumulus cloud, was carried slowly to the westward; rising gradually and at first enlarging itself, it next became feathery at the edges, and finally disappeared. The lower current of air was from the S. W., and moderate in force. An upper current, as shown by the direction of the small cloud just described, was passing at a small elevation from the N. N. W.

A second time a small cumulus cloud formed, at the distance of about two hundred yards above the smoke from the fire, and without visible connexion with it. This cloud enlarged in its ascent until, when about the same height as the former cloud, it began to move from the N. N. W. It next separated into two parts, one rising rapidly, and in turn breaking into two portions; the whole three small masses thus formed being carried slowly from the N. N. W., and the two lower ones gradually disappearing. A detached cloud of the same kind gradually formed to the leeward of the upper remaining one, presenting the general appearance, upon a small scale, of the detached masses which may be seen to form in the neighbourhood of thunder clouds in the summer season.

These observations were made on the 16th of August, between 1½ and 2 P. M. The temperature of the air was 80°, the evaporating point 64°, and the height of the barometer 28.74 inches. From these data the dew point may be calculated by Dr. Apjohn's formula to have been 52° 9.

The report, presented at the last meeting by the Committee on the Communications of Mr. Du Ponceau and Mr. Fisher, was considered, and the resolution with which it closed was adopted.

The Committee review in their report, the papers which were referred to them, and take notice also of some additional facts that bear upon the same subject. In conclusion, they congratulate the Society on the important accession to the knowledge of our early history, which has resulted from the labours of Mr. Du Ponceau and Mr. Fisher. Yet it must be admitted, they say, that chasms still remain in our early annals which require to be filled up; that doubts exist on some points, and discrepancies of opinion on others. The question arises: Shall we give publicity to the Society's early history in its present imperfect state, or shall we delay in the hope of obtaining more facts? The Committee express themselves in favour of the latter course, and recommend the adoption by the Society of the following resolution:

Resolved, That the papers of Mr. Du Ponceau and Mr. Fisher, which were read on the 26th of June, 1840, together with the supplementary communications, be deposited in the Archives, as valuable contributions to the early history of the Society.

Mr. Du Ponceau, by permission of the Society, withdrew his communication for the purpose of revising it.

Stated Meeting, November 19.

Present, seventeen members.

Dr. PATTERSON, Vice President, in the Chair.

A letter was received and read from Jac. Berzelius, Perpetual Secretary of the Academy of Sciences of Stockholm, dated 28th September, 1841, acknowledging the receipt of the Transactions and Proceedings of the Society.